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# An Ethnobotanical Survey of Useful Plants in the Agro Nocerino Sarnese (Campania, Southern Italy)

**Riccardo Motti**[1] · **Pierfrancesco Motti**[2]



**Keywords** Ethnobotany · Phytotherapy · Plant traditional uses · Agro Nocerino Sarnese · Campania · Southern Italy

## Introduction

The Mediterranean Basin is one of the world's major centres for plant diversity, where 10% of the world's higher plants can be found in an area representing only 1.6% of the Earth's surface (Médail and Quézel 1997). This area has been inhabited for millennia and a broad knowledge of useful plants has thus been passed down the generations. In the Mediterranean Basin where changes in the physical and biological environment, rural depopulation, new modes of communication and so forth are causing an accelerated loss of traditional knowledge, ethnobotanical studies are becoming more urgent (González-Tejero *et al.* 2008). According to Pieroni (2000): "Systematic explorations of traditional pharmacopeias are urgent in southern Europe, especially in those areas which, for geographical and historical reasons, remain relatively isolated and where industrial development has not led to a complete decline of their traditions". In the southern Italian region of Campania recent ethnobotanical research has focused on the provinces of Salerno and Naples (Menale *et al.* 2016; Menale and Muoio 2014; Di Novella *et al.* 2013; Savo *et al.* 2011; Motti *et al.* 2009; Salerno and Guarrera 2008; De Natale and Pollio 2007; Scherrer *et al.* 2005; De Feo and Senatore 1993; De Feo *et al.* 1992). In this work, we studied local ethnobotanical uses (for medicinal, domestic, food and feed purposes) of wild and cultivated plants in the Agro Nocerino Sarnese (hereafter abbreviated as ANS), an area spanning the provinces of Salerno and Naples in Campania with a long history of agricultural land use. The aim of the present study was to highlight the persistence of traditional plant knowledge (TPK) in the ANS area and to contribute to the advances of ethnobotanical knowledge in this region of southern Italy.

## The Study Area

The study area covers an area of about 188 km$^2$ and comprises 14 municipalities in the province of Salerno and two in the province of Naples, with a total population of about 300,000. It is bordered to the NE by the Picentini mountains which separate it from the province of Avellino, to the NW by Nola, to the W by the Vesuvian area and to the S by the Lattari mountains. The climate is typically Mediterranean with a summer drought lasting from June to August. Given the proximity of the Tyrrhenian Sea and the modest elevations reached by this area, snowfall is rare and practically negligible in defining the climate of the area. The area has been inhabited since prehistoric times and enjoyed periods of prosperity both in the Etruscan and Roman eras. The economy is now based primarily on the production of the San Marzano plum tomato, one of the most important cultivars in the world. As shown in Figs. 1 and 2 rural and urban land use account for about 78% of whole area, with little more than one-fifth being classified as natural.

## Methodology

Fieldwork was conducted from March 2014 to October 2016 throughout the ANS. For interviews, we selected local experts

✉ Riccardo Motti
motti@unina.it

[1] Department of Agriculture, University of Naples Federico II, Via Università, 100, 80055 Portici, Italy

[2] Department of Chemical Sciences, University of Naples Federico II, Via Cinthia 4, 8016 Naples, Italy

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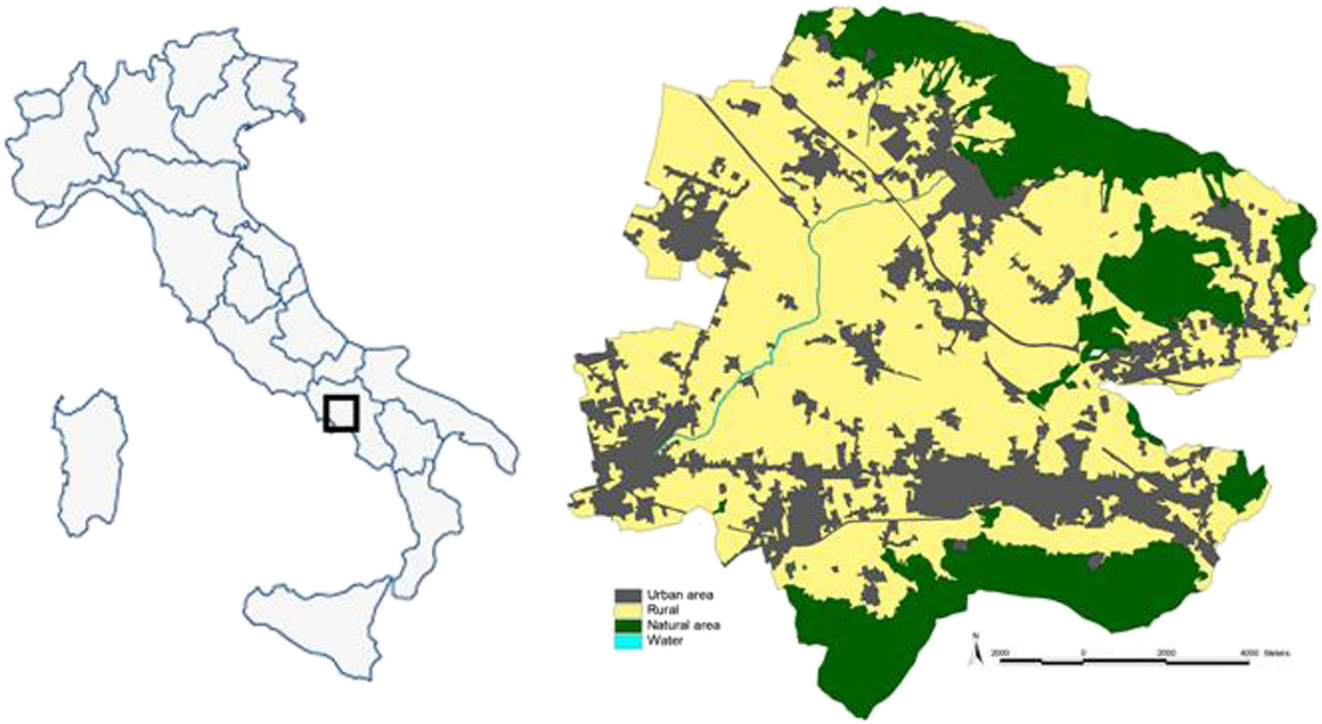


**Fig. 1** Study area with information on land use

(key informants) (Martin 2004) working, either currently or in the past, as farmers who, because of their greater age, occupation, family tradition or personal interests, were most likely to have retained ethnobotanical knowledge. We applied a snowball sampling approach (Cotton 1996; Höft *et al.* 1999; Cunningham 2001; Martin 2004) asking the informants to indicate further people experienced in traditional plant use. To encourage communication and memory flow, we carried out a semi-structured interview to acquire information on medicinal, food and craft plant uses (Idolo *et al.* 2010).

In all, 60 informants (25 men, 35 women) with an average age (±standard deviation.) of 72.3 ± 9.2 years (range 51–92 years) were interviewed in the towns of Scafati (4), Poggiomarino (8), Nocera Inferiore (2), Sant'Egidio (2), Castel San Giorgio (3), Striano (5), Pagani (4), Angri (11), Sarno (6), Pagani (9), Corbara (3) and San Marzano sul Sarno (2).

The plant specimens collected in the presence of the informants were identified at the herbarium of the Botanical Garden of Portici (PORUN) according to Pignatti (1982), Tutin *et al.* (1964-1980, 1993) and Castroviejo (1986-2007). Nomenclature follows Conti *et al.* (2005, 2007). Families are organised based on APG IV (Chase *et al.* 2016) for angiosperms. Abbreviations of authors are standardised as indicated in Brummitt and Powell (1992), as recommended by the International Code of Botanical Nomenclature (McNeill *et al.* 2006). Herbarium specimens were deposited in the PORUN herbarium.

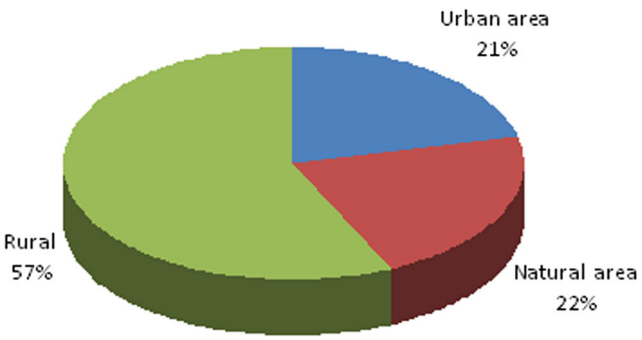


**Fig. 2** Percentage of land use in the ANS area

## Data Analysis

We set up a database including taxon, local name(s) (when mentioned), parts used, preparation, administration and use recorded. Each citation of a single part of a species was recorded as one use report. If an informant used a plant to treat more than one disease it was considered a single use.

The relative frequency of citation (RFC) index is obtained by dividing the number of informants who mention the use of the species, also known as frequency of citation (FC), by the number of informants participating in the survey (N). This index theoretically varies from 0, when nobody refers to the

plant as useful, to 1 in the unlikely case that all the informants were to mention use of the species (Tardío and Pardo-de-Santayana 2008).

To evaluate the variability in the use of medicinal plants and to determine whether plants from certain groups are of particular interest in the search for bioactive compounds, the informant consensus factor ($F_{ic}$) was calculated. Culturally important plants are those that are used by a large number of healers for the same category of indigenous use, while plants that are cited as useful by only one or two informants are considered to be of low cultural importance (Heinrich *et al.* 1988). Values will be high (near 1) if there is a well-defined selection criterion in the community and/or if information is exchanged between informants. The ICF was calculated as in the following formula:

$$\mathrm{ICF} = \frac{Nur - Nt}{Nur - 1}$$

where *Nur* is the number of citations used in each category and *Nt* the number of species used.

To determine the most frequently used plant species for treating a particular ailment category by the informants of the study area, we calculated the fidelity level (FL) (Morvin Yabesh *et al.* 2014). Fidelity level (FL) was calculated according to the following formula:

$$\mathrm{FL} = \frac{Np}{N} 100$$

where Np refers to the number of use reports for a given species reported to be used for a particular ailment category, and N is the total number of use reports cited for any given species.

## Results and Discussion

The 93 taxa reported by informants in the ANS area are listed in alphabetical order in Table 1. The plant species belong to 41 families: Rosaceae and Asteraceae were the most cited families (20%), followed by Poaceae (17%), Lamiaceae (17%), Apiaceae, Malvaceae and Brassicaceae (10%).

Analysis of the chorological spectrum (Fig. 3) of the species reported in our interviews reveals the clear dominance of alien species (36.7%). These are all neophytes and mostly cultivated in fields or in gardens. A substantial percentage of cosmopolitan species (22.6%) emerges. These data confirm the species poorness of the flora in the ANS area: agricultural and urban land use predominate, and natural areas account for a small part of the area. Spontaneous flora available for ethnobotanical uses is mostly represented by weeds or species, growing along paths and field borders.

In all, 767 use reports were obtained with an average per informant of (±standard deviation.) 10.2 ± 4.3. As shown in Fig. 4 the Asteraceae family covers 17.4% of use reports followed by Solanaceae (7.6%) and Amaryllidaceae (6.3%). The Asteraceae family is one of the most widely used plant families in southern Italy according to ethnobotanical studies (Menale *et al.* 2016; Menale and Muoio 2014 *et al*. 2014; Leto *et al.* 2013; Di Novella *et al.* 2013, De Natale and Pollio 2007).

The use reports concern medicinal applications (613), culinary uses (87) and domestic uses (67).

### Medicinal Applications

In all, 613 use reports were recorded for medicinal plants. Eighty-one species were reported as having medicinal applications, the plants most commonly cited being: *Matricaria chamomilla* (56 use reports), *Solanum lycopersicum* (29), *Allium sativum* (28), *Lactuca sativa* (28), *Malva sylvestris* (27), *Citrus* x *limon* (26) and *Foeniculum vulgare* (25).

As shown in Fig. 5, leaves were the most frequently used plant parts (38%), followed by fruits (24%), flowers (9%) stems and seeds (7% each), and bulbs (6%). The remaining parts accounted for 9% overall.

According to our results, decoction (45.3%) and raw (43%) are the main used modes of preparation, boiled leaves are often used for topical applications (9.5%).

We identified 11 ailment categories. Most of the remedies concern the treatment of unimportant pathologies, referring to disorders of the skin, and the respiratory and digestive systems, in agreement with the results obtained by others for southern Europe (González *et al.* 2010). Skin disease and respiratory system illness are probably due to the daily rural activity widely practised in the ANS area. Among skin disease there is a predominance of insect bites, chilblains and burns, while the most cited respiratory ailments are colds and coughs. With regard to the cardiovascular system, folk medicine mainly concerns the control of hypercholesterolaemia and blood circulation. Among urogenital diseases treated by healers with plants, there are menstrual pains, cystitis and kidney stones; some species are traditionally used as diuretics. The use of plants to aid miscarriage in unwanted pregnancies is no longer in use. A group of species is reported as being generic purgatives and, as underlined by Pieroni (2000), their 'cleansing' action, sometimes more narrowly described as 'blood cleansing', 'intestine cleansing' and 'liver cleansing', is only approximately translatable as diuretic or mild laxative or cholagogue properties. In the folk culture of the study area 'cleansing' is also translatable as depurative, tonic, refreshing, roborant or remineralising.

As shown in Table 2 seven species had the FL maximum of 100%: three for skin diseases (*Aloe arborescens*, *Brassica oleracea*, *Solanum lycopersicon*), three for respiratory system diseases (*Ceratonia siliqua*, *Hordeum vulgare*, *Malus*

**Table 1** Traditionally used plants in the areas of Agro Nocerino Sarnese

| Scientific name (Family) | Local name | Part used | Preparation | Administration | Uses recorded | RFC |
|---|---|---|---|---|---|---|
| *Agave americana* L. (Asparagaceae) | Agave | Leaves | Raw | Topical | **Med**: poultice on heel for calcaneal spur | **0.017** |
| *Allium cepa* L. (Amaryllidaceae) | Cepolla | Bulbs | Decoction | Oral | **Med**: cough | **0.333** |
| | | Bulbs | Raw | Oral | **Med**: juice used for gargling against sore throat | |
| | | Bulbs | Raw | Oral | **Med**: eaten fresh or cooked for hypercholesterolaemia | |
| | | Bulbs | Raw | Oral | **Med**: eaten fresh or cooked for diabetes | |
| | | Bulbs | Raw | Topical | **Med**: rubbed on insect bites | |
| | | Bulbs | Raw | Topical | **Med**: slices put on skin burns | |
| | | Bulbs | Raw | Topical | **Med**: like a gauze to protect wounds | |
| *Allium sativum* L. (Amaryllidaceae) | Aglio | Bulbs | Raw or decoction | Oral | **Med**: for children as anthelmintic, also placed under the nose | **0.467** |
| | | Bulbs | Raw or decoction | Oral | **Med**: blood pressure | |
| | | Bulbs | Raw or decoction | Oral | **Med**: febrifuge | |
| | | Bulbs | Raw | Topical | **Med**: rubbed against hair loss | |
| *Aloe arborescens* Miller (Xanthorrhoeaceae) | Aloe | Leaves | Raw | Topical | **Med**: pulp and juice on skin burns | **0.067** |
| | | | Raw | Topical | **Med**: pulp and juice for dermatitis | |
| *Ampelodesma mauritanicus* (Poir.) Dur. & Schinz, (Poaceae) | Pagliaspesso, lesche | Stem | | | **Dom**: fibres used to wrap bottles | **0.033** |
| *Anchusa undulata* L. subsp. *hybrida* (Ten.) Coutinho (Boraginaceae) | Primmavera | Leaves | Decoction | Oral | **Med**: diarrhoea | **0.017** |
| *Arundo donax* L. (Poaceae) | Canna | Stem | | | **Dom**: fibres used to wrap bottles and to make baskets | **0.067** |
| *Avena sativa* L. (Poaceae) | Avena | Seeds | Decoction | Oral | **Med**: kidney depurative | **0.033** |
| | | Seeds | Decoction | Oral | **Med**: stomach disorders | |
| *Beta vulgaris* L. (Amaranthaceae) | Bieta | Leaves | Boiled | Oral | **Med**: digestive | **0.100** |
| | | | Decoction | Oral | **Med**: cystitis | |
| | | Roots | Decoction | Oral | **Med**: gastritis | |
| | | Leaves | Raw | Topical | **Med**: abscesses | |
| *Borago officinalis* L. (Boraginaceae) | Vurròina, vurraggine | Leaves | Decoction | Oral | **Med**: depurative | **0.283** |
| | | Leaves | Decoction | Oral | **Med**: diuretic | |
| | | Leaves | Decoction | Oral | **Med**: menstrual pains | |
| | | Leaves | Decoction | Oral | **Med**: hypercholesterolaemia | |
| | | Leaves | | | **Cul**: ingredient for soup and omelette | |
| *Brassica oleracea var. botrytis* and var. *sabauda* (Brassicaceae) | Turzone, verza, cauliciore | Leaves | Raw | Topical | **Med**: abscesses and forunculosis | **0.167** |
| *Brassica rapa* L. (Brassicaceae) | Rapesta | Leaves | Decoction | Oral | **Med**: constipation | **0.033** |
| *Clinopodium nepeta* (L.) Kuntze subsp. *nepeta*! (Lamiaceae) | Mentuccia | Leaves | | | **Cul**: ingredient for salad | **0.183** |
| | | Leaves | Decoction | Oral | **Med**: ingredient in 'Ricotto' | |
| | | Leaves | | | **Dom**: with carobs, lemon leaves, fennel seeds mixed with raspberry to clean the barrels | |
| *Calendula arvensis subsp. arvensis* (Asteraceae) | Calennula | Leaves | Decoction | Topical | **Med**: compress on skin burns | **0.017** |
| *Capsella bursa-pastoris* (L.) Medicus; *C. rubella* Reuter (Brassicaceae) | Zlusielli | Leaves | Decoction | Oral | **Med**: gallstones | **0.017** |

**Table 1** (continued)

| Scientific name (Family) | Local name | Part used | Preparation | Administration | Uses recorded | RFC |
|---|---|---|---|---|---|---|
| *Capsicum annuum* L. (Solanaceae) | Pupuarolo forte, peperoncino | Fruit | Raw | Oral | **Med**: blood circulation | **0.150** |
| | | Fruit | Raw | Oral | **Med**: sinusitis | |
| | | Fruit | Raw | Oral | **Med**: cold | |
| | | Fruit | Raw | Oral | **Med**: headache | |
| | | Fruit | Raw | Oral | **Med**: antidiabetic | |
| *Carpobrotus edulis* (L.) N. E. Br. (Aizoaceae) | Erba de janare | Leaves | Raw | Topical | **Med**: haemorrhoids | **0.033** |
| *Ceratonia siliqua* L. (Fabaceae) | Sciuscelle | Fruit | Decoction | Oral | **Med**: ingredient in 'Ricotto' | **0.183** |
| *Chelidonium majus* L. (Papaveraceae) | Evra p'è puorr | Latex | Raw | Topical | **Med**: warts | **0.150** |
| *Cichorium intybus* L. (Asteraceae) | Cicoria | Leaves | Decoction | Oral | **Med**: hypercholesterolaemia | **0.467** |
| | | Leaves | Decoction | Oral | **Med:** depurative | |
| | | Leaves | | | **Cul**: soup ingredient | |
| *Citrus* x limon (L.) Osbeck (Rutaceae) | Limone | Fruit | Boiled | Fumigation | **Med:** fruit skin in boiling water for cold | **0.517** |
| | | Fruit | Raw | Topical | **Med**: bandaging with lemon slices for headache | |
| | | Fruit | Raw | Oral | **Med**: fruit slices, ingredient in 'Ricotto' | |
| | | Fruit | Decoction | Oral | **Med:** fruit skin boiled in water as digestive | |
| | | Juice | Raw | Oral | **Med:** cold | |
| | | Juice | Raw | Oral | **Med:** digestive | |
| | | Juice | Raw | Oral | **Med:** for blood circulation | |
| | | Juice | Raw | Oral | **Med**: diarrhoea | |
| | | Juice | Raw | Oral | **Med**: gargles for sore throat | |
| | | Juice | Raw | Oral | **Cul**: liqueur called 'Limoncello' made from the fruit exocarp | |
| | | Juice | Raw | Fumigation | **Med:** inhaled to cure sinusitis | |
| | | Leaves | Raw | | **Dom**: to clean barrels (see *Clinopodium n.*) | |
| *Citrus reticulata* Blanco (Rutaceae) | Mandarino | Fruit | Raw | Oral | **Med**: fruit skin as an ingredient for 'Ricotto' | **0.033** |
| | | Fruit | | | **Cul**: liqueur called 'Mandarinetto' made from the fruit exocarp | |
| *Clematis vitalba* (Ranunculaceae) | Vtaulo, vetusa | Young shoots | | | **Cul**: young shoots boiled and eaten in salads or fried | **0.067** |
| *Cucumis sativus* L. (Cucurbitaceae) | Cetrulo | Fruit | Raw | Topical | **Med**: furunculosis | **0.083** |
| | | Fruit | Raw | Topical | **Med**: eye mask | |
| | | Fruit | Raw | Oral | **Med**: diuretic | |
| *Cucurbita maxima* Duchesne (Cucurbitaceae) | Cocozza | Seeds | Raw | Oral | **Med**: prostatite | **0.033** |
| *Cynara scolymus* L. (Asteraceae) | Carcioffola | Receptacles | Boiled | Oral | **Med**: hypercholesterolaemia | **0.033** |
| | | Receptacles | Boiled | Oral | **Med**: liver depurative | |
| *Cynodon dactylon* L. (Poaceae) | Rammegna | Rhizome | Decoction | Oral | **Med**: gastritis | **0.233** |
| | | Rhizome | Decoction | Oral | **Med**: cystitis | |
| | | Rhizome | Decoction | Oral | **Med**: kidney stones | |
| | | Rhizome | Decoction | Oral | **Med**: ingredient in 'Ricotto' | |
| | | Rhizome | Decoction | Oral | **Med**: diuretic | |
| | | Rhizome | Boiled | Topical | **Med**: rhizome boiled and put on gums to cure abscesses | |
| *Daucus carota* L. (Apiaceae) | Carota | Roots | Decoction | Oral | **Med**: gallstones | **0.017** |
| *Diplotaxis tenuifolia* (L.) DC. (Brassicaceae) | Rucola | Leaves | Eaten raw | Oral | **Med**: digestive | **0.100** |
| | | Leaves | Eaten raw | Oral | **Med**: aperitif | |
| | | Leaves | Decoction | Oral | **Med**: laxative | |
| *Dipsacus fullonum* L. (Caprifoliaceae) | Cardone | Flowers | Decoction | Topical | **Med**: skin disease | **0.017** |
| *Eucaliptus camaldulensis* Dehnh., *E. globulus* Labill. (Myrtaceae) | Calipso | Leaves | Boiled | Fumigation | **Med**: respiratory ailments | **0.050** |

**Table 1** (continued)

| Scientific name (Family) | Local name | Part used | Preparation | Administration | Uses recorded | RFC |
|---|---|---|---|---|---|---|
| *Euphorbia helioscopia* L. (Euphorbiaceae) | Tutumaglia | Latex | Raw | Topical | **Med**: warts | **0.083** |
| *Ferula glauca* L. (Apiaceae) | Finocchiaccio | Stem | | | **Dom**: used with the pumice to sharpen the blades | **0.017** |
| *Ficus carica* L. (Moraceae) | Fica | Fruit | Decoction | Oral | **Med**: dried fruits are an ingredient in 'Ricotto' | **0.400** |
| | | Fruit | Decoction | Oral | **Med**: syrup against cold | |
| | | Latex | Raw | Topical | **Med**: warts | |
| *Foeniculum vulgare* Miller (Apiaceae) | Fnucchiu | Seeds | Decoction | Oral | **Med**: ingredient in 'Ricotto' | **0.517** |
| | | Seeds | Decoction | Oral | **Med**: digestive | |
| | | Seeds | Decoction | Oral | **Med**: carminative | |
| | | Seeds and leaves | Decoction | Oral | **Med**: galactagogue | |
| | | Seeds | Decoction | Oral | **Med**: gastritis | |
| | | Seeds | | | **Cul**: liqueur called 'Finocchietto' made from the infusion of seeds in pure alcohol | |
| | | Seeds | | | **Dom**: with apples to clean the barrels | |
| | | Seeds | | | **Cul**: flavouring in dried figs | |
| | | Seeds | | | **Cul**: flavouring in 'Taralli' | |
| *Fragaria vesca* L. (Rosaceae) | Fragola | Fruit | Raw | Oral | **Med**: laxative | **0.017** |
| *Hordeum vulgare* L. (Poaceae) | Orzo | Seed | Decoction | Oral | **Med**: ingredient in 'Ricotto' | **0.167** |
| *Hypericum perforatum* L. (Hypericaceae) | Erba di San Giovanni | Whole plant | Raw | Topical | **Med**: plant is macerated in olive oil against skin burns | **0.033** |
| *Iris germanica* L. (Iridaceae) | Spatella | Rhizome | Raw | Topical | **Med**: rhizome grated and boiled to treat chilblains | **0.117** |
| | | Rhizome | Raw | | **Dom**: grated rhizome to perfume washing | |
| | | Flowers | | | **Dom**: to prepare ink | |
| *Lactuca sativa* L. (Asteraceae) | Lattuga | Leaf | Boiled | Topical | **Med**: boiled leaves to treat dental abscesses or spots | **0.450** |
| | | Leaf | Boiled | Topical | **Med**: boiled leaves to treat inflammation of the nipple during lactation | |
| | | Leaf | Boiled | Topical | **Med**: boiled leaves to treat furunculosis | |
| | | Leaf | Decoction | Oral | **Med**: colitis | |
| *Laurus nobilis* L. (Lauraceae) | Alloro | Leaf | Decoction | Oral | **Med**: abdominal pains | **0.400** |
| | | Leaf | Decoction | Oral | **Med**: menstrual pains | |
| | | Leaf | Decoction | Oral | **Med**: sore stomach | |
| | | | | | **Med**: ingredient in 'Ricotto' | |
| *Lavandula angustifolia* Miller (Lamiaceae) | Lavanda | Inflorescence | | | **Dom**: to perfume clothes | **0.117** |
| *Linum usitatissimum* L. (Linaceae) | Lino | Seed | Boiled | Topical | **Med**: the poultice of boiled seeds, put in a towel and applied on the chest to treat bronchitis | **0.100** |
| | | Seed | Boiled | Topical | **Med**: the poultice of boiled seeds, put in a towel and applied on abscesses | |
| *Malus domestica* Borkh. (Rosaceae) | Mela | Fruit | Decoction | Oral | **Med**: dried fruit ingredient in 'Ricotto' | **0.133** |
| *Malva sylvestris* L. (Malvaceae) | | Leaf and root | Decoction | Oral | **Med**: gastritis | **0.450** |
| | Malva | Root | Decoction | Oral | **Med**: colitis | |
| | | Leaf and root | Decoction | Oral | **Med**: ingredient in 'Ricotto' | |
| | | Leaf and root | Decoction | Topical | **Med**: for mouth washes against toothache | |
| *Matricaria chamomilla* L. (Asteraceae) | Camomilla | Flowers | Decoction | Oral | **Med**: as intestinal spasmolitic. | **0.950** |

**Table 1** (continued)

| Scientific name (Family) | Local name | Part used | Preparation | Administration | Uses recorded | RFC |
|---|---|---|---|---|---|---|
| | | Flowers | Decoction | Oral | **Med**: sedative | |
| | | Flowers | Decoction | Oral | **Med**: menstrual pains | |
| | | Flowers | Decoction | Oral | **Med**: gastritis | |
| | | Flowers | Decoction | Oral | **Med**: ingredient in 'Ricotto' | |
| | | Flower and leaf | Boiled | Topical | **Med**: compress of boiled flowers and leaves as anti-inflammatory | |
| | | Flower | | | **Dom**: to enhance the colour of blond hair | |
| *Mentha* spp. (Lamiaceae) | Menta | Leaf | Decoction | Oral | **Med**: constipation | **0.033** |
| *Mercurialis annua* L. (Euphorbiaceae) | Mercurella | Leaf | Decoction | Oral | **Med**: constipation | **0.050** |
| | | Whole plant | Raw | Topical | **Med**: the poultice of whole plant applied on warts | |
| *Morus alba* L. (Moraceae) | Ceveza | Fruit | Raw | Oral | **Med**: constipation | **0.050** |
| *Ocimum basilicum* L. (Lamiaceae) | Vasenicola | Leaf | Decoction | Oral | **Med**: carminative | **0.133** |
| | | Leaf | Raw | Topical | **Med**: the poultice on furuncles to induce maturity | |
| | | Leaf | Raw | Topical | **Med**: rubbed on insect bites | |
| | | Leaf | Decoction | Oral | **Med**: sedative | |
| *Olea europaea* L. (Oleaceae) | | Leaf | Decoction | Oral | **Med**: to reduce blood pressure | **0.267** |
| | | Oil | Raw | Topical | **Med**: two or three drops of warm oil in the ear to cure otitis | |
| | | Oil | Raw | Topical | **Med**: skin burns | |
| | | Oil | Raw | Topical | **Med**: to facilitate the removal of thorns from the skin | |
| | | Oil | Raw | Topical | **Med**: a towel soaked with oil on the throat or by massaging oil on the wrist against tonsillitis | |
| | | Oil | Raw | Oral | **Med:** hypercholesterolaemia | |
| | | Oil | Raw | Oral | **Med**: constipation | |
| | | Oil | | | **Dom**: sting the base of the fruit with a lubricated needle to bring forward fruit ripening | |
| *Opuntia ficus-indica* (L.) Miller (Cactaceae) | Figurine | Fruit | Cooking | Oral | **Med:** whooping cough | **0.117** |
| | | Cladode | Decoction | Oral | **Med:** gastritis | |
| | | Cladode | Raw | Topical | **Med:** bruises and fractures | |
| | | Cladode | Raw | Topical | **Med**: skin burns | |
| *Origanum vulgare* L. subsp. *viridulum* (Martrin-Donos) Nyman (Lamiaceae) | | Leaves | | | **Cul**: food aromatizer | **0.050** |
| *Papaver rhoeas* L. (Papaveraceae) | | Flower | Decoction | Oral | **Med**: sedative | **0.150** |
| | | Flowers | | | **Dom**: to prepare ink | |
| *Parietaria judaica* L. (Urticaceae) | Evr 'e muro, vitriola | Aerial parts | Infusion | Topical | **Med**: crushed leaves or a poultice with olive oil applied on haematomas, sprains, bruises and arthritis | **0.433** |
| | | Leaves | | | **Dom**: to clean bottles and glasses | |
| *Alcea rosea* L. (Malvaceae) | Malvarosa | Leaves | Decoction | Oral | **Med**: cystitis | **0.033** |
| | | Leaves | Decoction | Topical | **Med**: crushed leaves applied on abscesses | |
| *Petroselinum crispum* (Miller) Fuss (Apiaceae) | Petrusino | Leaf and fruit | Decoction | Oral | **Med**: abortive | **0.083** |
| *Pinus pinea* L., *P. halepensis* Miller (Pinaceae) | Pigna | Leaf | Decoction | Fumigation | **Med**: respiratory ailments | **0.033** |
| *Phytolacca americana* L. (Phytolaccaceae) | | Fruit | | | **Dom**: to prepare ink | **0.017** |
| *Plantago lanceolata* L. (Plantaginaceae) | Cinchenierve | Leaf | Decoction | Oral | **Med**: furuncles and abscesses | **0.117** |

**Table 1** (continued)

| Scientific name (Family) | Local name | Part used | Preparation | Administration | Uses recorded | RFC |
|---|---|---|---|---|---|---|
| | | Leaf | Boiled | Topical | **Med**: boiled leaves on the chest against coughs | |
| | | Leaf | Raw | Topical | **Med**: insect bites | |
| | | Whole plant | Decoction | Oral | **Med**: ingredient in 'Ricotto' | |
| *Plantago major* L. (Plantaginaceae) | Cinchenierve, centonierve | Leaf | Raw | Topical | **Med**: cicatrizer | **0.183** |
| | | Leaf | Raw | Topical | **Med**: wounds | |
| | | Leaf | Raw | Topical | **Med**: bedsores | |
| | | Leaf | | | **Cul**: ingredient for soup | |
| | | Whole plant | Decoction | Oral | **Med**: ingredient in 'Ricotto' | |
| *Polygonum aviculare* L. (Polygonaceae) | | Leaf | Decoction | Oral | **Med**: diarrhoea | **0.017** |
| *Portulaca oleracea* L. (Portulacaceae) | | Leaf | Raw | | **Cul**: ingredient for salad | **0.150** |
| *Prunus avium* L. (Rosaceae) | | Fruit | Raw | Oral | **Med**: constipation | **0.067** |
| | | Fruit pedicel | Decoction | Oral | **Med**: cough | |
| | | Fruit pedicel | Infusion | | **Cul**: infusion in red wine to make a liqueur | |
| *Prunus domestica* L. (Rosaceae) | Prugna | Dried or fresh fruit | Raw or decoction | Oral | **Med**: constipation | **0.167** |
| | | Dried fruit | Decoction | Oral | **Med**: ingredient of 'Ricotto' | |
| *Prunus dulcis* (Mill.) D. A. Webb (Rosaceae) | Mandorlo | Fruit | Raw | Oral | **Med**: hypercholesterolaemia | **0.017** |
| *Pyrus communis L.* (Rosaceae) | Pera | Dried fruit | Decoction | Oral | **Med**: ingredient in 'Ricotto' | **0.133** |
| *Raphanus raphanistrum* L. subsp. *raphanistrum* (Brassicaceae) | Rafano | Root | Raw | | **Cul**: fresh root grated on spaghetti | **0.033** |
| *Rosmarinus officinalis* L. (Lamiaceae) | Rosamarina | Leaf | Decoction | Oral | **Med**: cough | **0.050** |
| | | Leaf | Raw | Topical | **Med**: crushed leaves put in infusion in olive oil to treat arthritis | |
| | | Leaf | Decoction | Oral | **Med**: hypercholesterolaemia | |
| *Rubus ulmifolius* Schott (Rosaceae) | | Leaf | Raw | Topical | **Med**: insect bites | **0.117** |
| | | Leaf | Raw | Topical | **Med**: abscesses | |
| | | Young shoots and leaves | Decoction | Oral | **Med**: diarrhoea | |
| | | Fruit | Candy or in alcohol | Oral | **Med**: blood circulation | |
| *Ruscus aculeatus* L. (Asparagaceae) | Pungitopo | Young shoots | Decoction | Oral | **Med**: kidney stones | **0.083** |
| | | Young shoots | | | **Cul**: boiled and in an omelette | |
| *Ruta chalepensis* L. (Rutaceae) | Ruta, aruta | Leaf | Decoction | Oral | **Med**: emmenagogue | **0.067** |
| | | Leaf | Decoction | Oral | **Med**: sedative | |
| | | Young shoots and leaves | Raw | Topical | **Med**: infused olive oil against toothache | |
| | | Young shoots and leaves | Raw | Topical | **Med**: infused olive oil applied to areas suffering from sciatica | |
| *Salix alba* L. (Salicaceae) | Salice | Stem | | | **Dom**: to make baskets, to bind vines | **0.317** |
| *Salvia officinalis* L. (Lamiaceae) | Salvia | Leaves | Raw | Topical | **Med**: clean the oral cavity and teeth | **0.200** |
| | | Leaves | Infusion | Oral | **Med**: digestive | |
| | | Leaves | Raw | Topical | **Med**: in hot bags on the neck for sore throat | |
| *Sambucus nigra* L. (Adoxaceae) | Sambuco | Flowers | Infusion | Oral | **Med**: cough | **0.067** |
| | | Flowers | Infusion | Oral | **Med**: to prepare syrup for sore throat | |
| *Saponaria officinalis* L. (Caryophyllaceae) | Saunara | Aerial parts | | | **Dom**: detergent for fabrics | **0.017** |
| *Solanum lycopersicon* L. (Solanaceae) | Pummarola | Fruit | Raw | Topical | **Med**: insect bites | **0.500** |

**Table 1** (continued)

| Scientific name (Family) | Local name | Part used | Preparation | Administration | Uses recorded | RFC |
|---|---|---|---|---|---|---|
| | | Fruit | Raw | Topical | **Med**: with sugar and lettuce on pimples | |
| | | Fruit | Raw | Topical | **Med**: with olive oil to treat sunburns | |
| | | Fruit | Raw | Topical | **Med**: abscesses | |
| | | Fruit | | | **Dom:** to wash hands | |
| *Solanum tuberosum* L. (Solanaceae) | Patana, patata | Tuber | Raw | Topical | **Med**: potato slices put on the forehead against headaches | **0.283** |
| | | Tuber | Raw | Topical | **Med**: cold | |
| | | Tuber | Boiled | Fumigation | **Med**: potato slices put on skin burn | |
| *Sonchus oleraceus* L.*Sonchus tenerrimus* L. (Asteraceae) | Cardillo, savuni | Leaves | Decoction | Oral | **Med**: depurative | **0.183** |
| | | Leaves | Raw | Topical | **Med**: chewed against toothache | |
| | | Leaves | | | **Cul:** ingredient for pizza and soup | |
| *Sorbus domestica* L. (Rosaceae) | Sovere | Leaves | Boiled | Topical | **Med**: boiled leaves to treat calluses | **0.033** |
| | | Fruit | | | **Cul**: fruit macerated in water to prepare a wine | |
| *Sorghum halepense* (L.) Pers. (Poaceae) | | Leaves | | | **Dom**: to make brooms to clean the oven | **0.033** |
| *Spartium junceum* L. (Fabaceae) | Ginestra | Stems | | | **Dom**: to make brooms and baskets | **0.017** |
| *Silybum marianum* (L.) Gaertn. (Asteraceae) | Cardo santo | Root | Boiled | Topical | **Med**: boiled leaves to treat rheumatism | **0.017** |
| *Taraxacum campyloides* G.E. Haglund (Asteraceae) | Custanzella, cicoria selvatica, piscialietto | Leaf | Decoction | Oral | **Med**: diuretic | **0.083** |
| | | Leaf | Decoction | | **Med**: depurative | |
| | | Leaf | | | **Cul**: soup ingredient | |
| *Tilia* spp. (Malvaceae) | Tiglio | Flowers | Decoction | Oral | **Med**: sedative | **0.033** |
| | | Flowers | Decoction | Oral | **Med**: abdominal pains | |
| *Umbilicus* horizontalis (Guss.) DC. (Crassulaceae) | Cucco | Leaves | Raw | Topical | **Med**: grilled leaves to treat chilblains and abscesses | **0.050** |
| *Urtica membranacea* Poir. (Urticaceae) | Ardeca | Leaves | Decoction | Oral | **Med**: depurative | **0.117** |
| | | Leaves | Decoction | Oral | **Med**: ingredient in 'Ricotto' | |
| | | Leaves | Decoction | Topical | **Med**: decoction of whole plant rubbed on head against hair loss | |
| | | Younger leaves | | | **Cul**: ingredient for soup, pizza and spaghetti | |
| *Verbascum sinuatum* L. (Scrophulariaceae) | Foglie d'a Madonna | Leaves | Raw | Topical | **Med**: haemorrhoids | **0.017** |
| *Vitis vinifera* L. (Vitaceae) | | Fruit | Boiled | Oral | **Med**: cooked wine for coughs | **0.067** |
| | | Latex | Raw | Topical | **Med**: conjunctivitis | |
| *Zea mays* L. (Poaceae) | Granoturco, Capelli della Madonna | Dried stylus | Decoction | Oral | **Med**: diuretic | **0.100** |
| | | Dried stylus | Decoction | Oral | **Med**: against hair loss | |

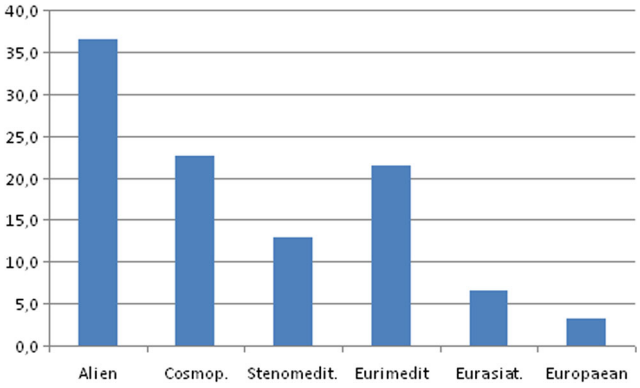


**Fig. 3** Chrological spectrum of the species reported by informants (percentage values)

*domestica*, which are all ingredients of a traditional preparation, used for respiratory ailments, called 'Ricotto', discussed below), and one species for skeletal-muscular system disorders (*Parietaria judaica*).

The ICF values calculated for the 11 ailment categories cited in the ANS area are shown in Table 3, arranged in descending order. The highest ICF (0.82) was scored for dental problems (gengival abscesses, toothache), respiratory diseases had the second highest ICF (0.819) with 32 species and 172 use reports, followed by gastro-intestinal and skin ailments, both with 29 species. Plants used for the endocrine system (mainly antidiabetic) and hair are cited as useful by only one informant and are considered to be of little cultural importance (ICF = 0).

## Species Most Frequently Cited for Medicinal Uses

*Matricaria chamomilla*: this species is a highly favoured and commonly used plant in folk and traditional medicine. Its multitherapeutic, cosmetic and nutritional values have been established through years of traditional lore and scientific use and research (Singh *et al.* 2011). According to the present research more than half of all informants (34) report this species as an intestinal spasmolytic or for treating gastritis. The dried flower heads of this species are widely used in folk medicine to prepare an anti-spastic tea not only in southern Italy but nationwide (Fortini *et al.* 2016; Vitalini *et al.* 2015; Cornara *et al.* 2014). Eight healers cite chamomile against menstrual pains and six as a light sedative. Many studies have been performed to clarify which component is responsible for these effects (Avallone *et al.* 2000). The most important constituents of the chamomile drug are sesquiterpenes and flavonoids, which have been studied extensively (Švehlíková and Repčák 2006). The use of compresses of boiled flowers and leaves as anti-inflammatory is confirmed by studies concerning the antioxidant, anti-inflammatory and antiproliferative properties of this plant (Trouillas *et al.* 2003).

*Solanum lycopersicon*: in the ANS area this species is widely cultivated. In the present study tomato is frequently reported as a useful plant to treat skin injuries (e.g. insect bites, sunburns, pimples and abscesses). The use of tomato juice for the treatment of skin diseases is reported by other authors in Italy (Guarrera 2005; Guarrera *et al.* 2005; Maccioni *et al.* 2008; Quave *et al.* 2008; Menale and Muoio 2014). The use of raw tomato for treating burns is also reported for Brazil (Di Stasi *et al.* 2002). Many of the reported health benefits of lycopene from dietary sources are attributed to its ability to protect cells against oxidative damage (Stahl *et al.* 2005), although there is no evidence in the literature concerning the topical use of the tomato.

*Allium sativum*: this species is widely reported in folk medicine as a remedy for a large number of ailments, particularly as anthelmintic and to lower blood pressure. In this century, more than 3000 publications have provided evidence for the efficacy of this herb in the prevention and treatment of a variety of diseases and for validating its traditional uses (Ghazanfari *et al.* 2006). The blood pressure-reducing properties of garlic have been linked to its hydrogen sulphide production and allicin content (Londhe *et al.* 2011).

*Lactuca sativa*: lettuce is widely reported in ethnobotanical research conducted in southern Italian regions as an antiodontalgic and for the treatment of teeth abscesses (Guarrera *et al.* 2005; Scherrer *et al.* 2005; Motti *et al.* 2009;

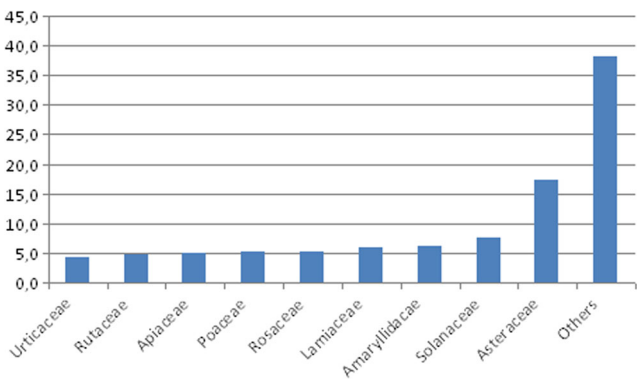


**Fig. 4** Distribution of use reports among the botanical families

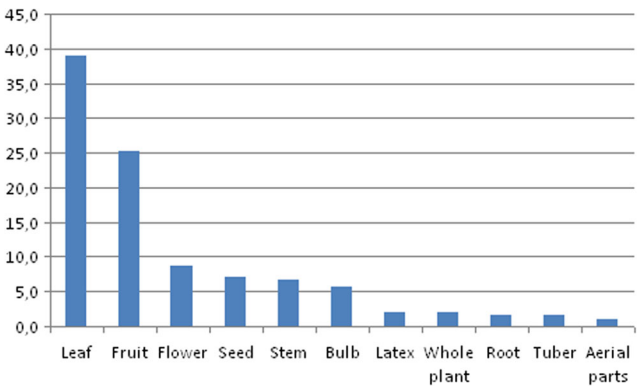


**Fig. 5** Plant parts used for medicinal applications

**Table 2** Fidelity level values for common medicinal plants used (RFC>0.150; FL>40)

| Ailment category | Species | FL (%) |
|---|---|---|
| Skin | *Aloe arborescens* | 100,0 |
| | *Brassica oleracea* | |
| | *Solanum lycopersicon* | |
| | *Allium cepa* | 65,0 |
| | *Iris germanica* | 1,8 |
| Respiratory system | *Ceratonia siliqua* | 100,0 |
| | *Hordeum vulgare* | |
| | *Malus domestica* | |
| | *Ficus carica* | 80,0 |
| | *Solanum tuberosum* | 2,2 |
| | *Malva sylvestris* | 2,0 |
| Gastro-intestinal | *Foeniculum vulgare* | 76,0 |
| | *Prunus domestica* | 70,0 |
| | *Matricaria chamomilla* | 2,4 |
| | *Malva sylvestris* | 2,0 |
| | *Citrus x limon* | 1,8 |
| Urogenital system | *Taraxacum officinale* | 2,8 |
| Cardiovascular system | *Allium sativum* | 1,9 |
| Skeleto-muscular system | *Parietaria judaica* | 100,0 |
| Teeth | *Lactuca sativa* | 3,5 |
| | *Salvia officinalis* | 75,0 |
| Nervous system | *Papaver rhoeas* | 3,7 |

Menale *et al.* 2016; Passalacqua *et al.* 2007). Compresses of boiled leaves are placed on inflamed teeth, or a decoction of the leaves is used for mouth washing.

*Malva sylvestris*: mallow is one of the most important medicinal species in the southern Italian folk pharmacopoeia (Quave *et al.* 2008). It is widely used in local traditional medicine mainly for the treatment of external and internal inflammation and inflammation-related diseases such as rheumatism (Conforti *et al.* 2008). In the ANS this species is mainly used to treat gastro-intestinal disease and as an ingredient in *ricotto* against respiratory system ailments. Mucilages are one of the major components responsible for the therapeutic effects of mallow, mainly due to their anti-complementary and cough suppression activities (Gasparetto *et al.* 2012). Other important phytochemical constituents of *Malva sylvestris* are: amino acids, protein derivatives, phenol derivatives, enzymes, terpenoids and vitamins.

*Citrus* x *limon*: this species is used for the treatment of the highest number of ailments (10) in the ANS area. It is one of the most widely used natural remedies in the Mediterranean basin. Lemons have many important natural chemical components, including citric acid, ascorbic acid, minerals and flavonoids. Although their health-related properties have always been associated with their vitamin C content, it has recently been shown that flavonoids also play a role in this respect (Del Río *et al.* 2004).

*Foeniculum vulgare*: 19 informants report fennel as carminative or digestive, a use which was also found in several other regions of Italy and in several Mediterranean countries, including Bulgaria (Leto *et al.* 2013; Ivancheva and Stantcheva 2000). Fennel is a well-known medicinal and aromatic plant widely used as carminative, digestive, galactogogue and diuretic and in treating respiratory and gastrointestinal disorders Phenols, phenolic glycosides and volatile aroma compounds such as trans-anethole, estragole and fenchone have been reported as the major phytoconstituents of this species (Rather *et al.* 2016).

An important role for the treatment of respiratory ailments (104 use reports) is performed by a preparation called in many cases 'Ricotto' or 'Ricuotto', still in use today and found in the traditional phytotherapy of other Italian regions (Motti *et al.* 2009; Idolo *et al.* 2010; Scherrer *et al.* 2005; Barone 1963). It is a long decoction (20–60 min) prepared with several ingredients which may vary from one informant to another. In the

**Table 3** Informant consensus factor for commonly used medicinal plants

| | Use reports (Nur) | Number of species (Nt) | ICF |
|---|---|---|---|
| Teeth | 38 | 5 | 0.892 |
| Respiratory system | 172 | 32 | 0.819 |
| Gastro-intestinal system | 140 | 29 | 0.799 |
| Skin | 138 | 29 | 0.796 |
| Nervous system | 18 | 5 | 0.765 |
| General | 23 | 8 | 0.682 |
| Cardiovascular system | 35 | 12 | 0.676 |
| Urogenital system | 28 | 10 | 0.667 |
| Skeleto-muscular system | 15 | 6 | 0.643 |
| Endocrine system | 3 | 3 | 0.000 |
| Hair | 3 | 3 | 0.000 |

ANS area the following 17 species were mentioned by informants for this kind of preparation:

- *Plantago lanceolata*, *Plantago major*: whole plant;
- *Ficus carica*, *Malus domestica*, *Pyrus communis*, *Ceratonia siliqua*, *Prunus dulcis*: dried fruits;
- *Citrus* x *limon*, *Citrus reticulata*: slices of fresh fruit or fruit skin;
- *Clinopodium nepeta subsp. nepeta*, *Laurus nobilis*, *Urtica membranacea*: leaves;
- *Cynodon dactylon*, *Malva sylvestris*: roots;
- *Foeniculum vulgare*, *Hordeum vulgare*: seeds;
- *Matricaria chamomilla*, *Malva sylvestris*: flowers;

After boiling the decoction is filtered before drinking and the fruits are sometimes eaten.

The following uses of medicinal plants differ from the reports in the ethnobotanical literature for Italy:

*Agave americana*: leaves used as a poultice applied topically on heels to treat heel spurs.
*Anchusa undulata* subsp. *hybrida*: decoction of leaves against diarrhoea.
*Borago officinalis*: decoction against hypercholesterolaemia
*Capsicum annuum*: eaten raw to stimulate nasal secretions against sinusitis.
*Carpobrotus edulis*: poultice of leaves for topical applications to treat haemorrhoids
*Cucurbita maxima*: seeds eaten raw to treat prostatitis.
*Umbilicus horizontalis*: grilled leaves to treat chilblains and abscesses

### Food Plants

Nine of the species reported as food plants are also used for therapeutic purposes (e.g. *Borago officinalis*, *Taraxacum officinale*, *Sonchus spp.*, *Urtica membranacea*). Several recent studies in the Mediterranean area focus on this food-medicine continuum, as well as the health-promoting properties of such plants (Scherrer *et al.* 2005). Although the availability of ingredients and processed food is much higher than in the early twentieth century, the gathering and consumption of spontaneous plants is still widely practised in the traditional cuisine.

*Borago officinalis* is one of the seven green vegetables that with meat and a clear chicken-based broth are the ingredients of the soup *minestra maritata* traditionally eaten at Eastertime, so-called because of the 'marriage' of greens and broth in the soup.

*Portulaca oleracea* has a long history of use for human food. In the past this plant was eaten raw during the vegetative season and dried (and sometimes preserved in olive oil) and eaten during the winter. Nowadays, it is only an ingredient for salad. Recent research indicates that purslane offers better nourishment than the main cultivated vegetables. In particular, it has a high percentage of α-linolenic acid (LNA) (Liu *et al.* 2000).

*Sonchus* species and *Urtica membranacea* are cooked as spinach substitutes in pizzas and soups. The culinary use of these species is reported elsewhere for southern Italy (Motti *et al.* 2009; Lentini and Venza 2007; Scherrer *et al.* 2005; De Feo *et al.* 1992). The food use of *Sonchus* species is justified by the high content of vitamin C, carotenoids and omega-3 fatty acids (Guarrera *et al.* 2006). Species of the genus *Urtica* are rich in aminoacids, proteins, minerals and vitamins (Guarrera 1994).

Throughout the ages, several health-promoting benefits, including diuretic, laxative, cholagogue, anti-rheumatic, anti-inflammatory, choleretic, anti-carcinogenic and hypoglycaemic activities, have been attributed to the use of *Taraxacum officinale*. Empirical traditional application in humans of dandelion, especially to treat digestive disorders, is supported by pharmacological investigations. Several studies have demonstrated further health-promoting properties of both dandelion extracts and individual compounds extracted from dandelion leaves or roots, e.g. anti-inflammatory, anti-carcinogenic and anti-oxidative activities (Schütz *et al.* 2006).

### Plants for Domestic and Craft Uses

The species mentioned by the informants are mainly used to wash and clean glass, barrels, etc. or to perfume clothes. Still in use are also plants for handicrafts, e.g. to make brooms and baskets. Some species are reported to prepare ink but this use would appear to have died out.

## Conclusions

An ethnobotanical study was carried out in the ANS area to help boost our knowledge of traditional plant use in Campania. This study highlighted the importance of medicinal plant species (with high FL and RFC values) used to cure various human ailments in areas, such as the ANS, where agriculture still represents the most important productive resource. Some informants reported deceased healers possessing great knowledge and the resulting loss of information concerning folk medicine in the study area. Hence ethnobotanical research in areas where industrial development has increased the erosion of traditional cultures takes on greater urgency.

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**Compliance with Ethical Standards**

**Conflict of Interest** The authors declare that they have no conflict of interest.

**Informed Consent** Respondents were made aware of the aims of this study and Prior Informed Consent was obtained verbally.

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